

ISST Review and Update

WR SOO/DOH Conference Call
19 February 2004

(Material extracted from a Briefing of the
Science and Technology Committee on February 4th)

Outline

- Review accomplishments and activities
- Eta extension and upcoming new model data
- Updated roadmap
- Analysis of Record
- FSL Resources for GFE Development

Accomplishments and Activities

- Identified an opportunity to fill "transmission gaps" on the SBN and developed a proposal now nearly implemented
 - Additional Eta 12 and GFS data
- Working with MDL on their efforts to implement COOP and gridded MOS
 - Number of MOS sites increased by an order of magnitude
 - COOP MOS available for GFE ingest via MatchMOSAll
- Provided scientific critique and feedback into the 10-506 directive process and NVIWT verification plan design
- Recently met with Digital Services CONOPS team
- Investigated and prioritized a spectrum of downscaling possibilities and reported to S&T Committee
- Conceived, developed, and championed the Eta extension

Outline of Model Data on the Way

- Requirements from May 2003 WR SOO/DOH workshop
 - Eta12 surface data through 84 hrs, 4 times/day
 - Additional GFS vertical data
- Previous requirements in place (OB3.2 or 4)
 - Full Eta12 through 84 hrs
 - Full GFS
- Proposed ISST solution to downscaling medium range model data for GFE
 - Downscaled GFS and Eta Extension (DGEX)

Additional Eta12 Data (RC #AB665)

- Surface data extended to full 84 hrs
 - added 63, 66, 69, 72, 75, 78, 81, and 84 hrs
 - 0-84 hrs available from 00, 06, 12 & 18 UTC runs
- In AWIPS as of 18 February 2004

Additional GFS Vertical Data (RC #AB666)

- GFS additional levels at 80 km through 168 hrs
 - Sfc, BL (0-30,30-60,60-90,90-120,120-150,150-180)
1000-500 x 25 mb, 500-100 x 50 mb (Z,T u, v, RH)
- Status (2/4/04)
 - Concern with additional load on TOC legacy mainframe
 - Continued migration from mainframe should allow for fewer interruptions over time
 - Data may arrive out of forecast sequence (acceptable)
 - Target AWIPS implementation date: Spring 2004

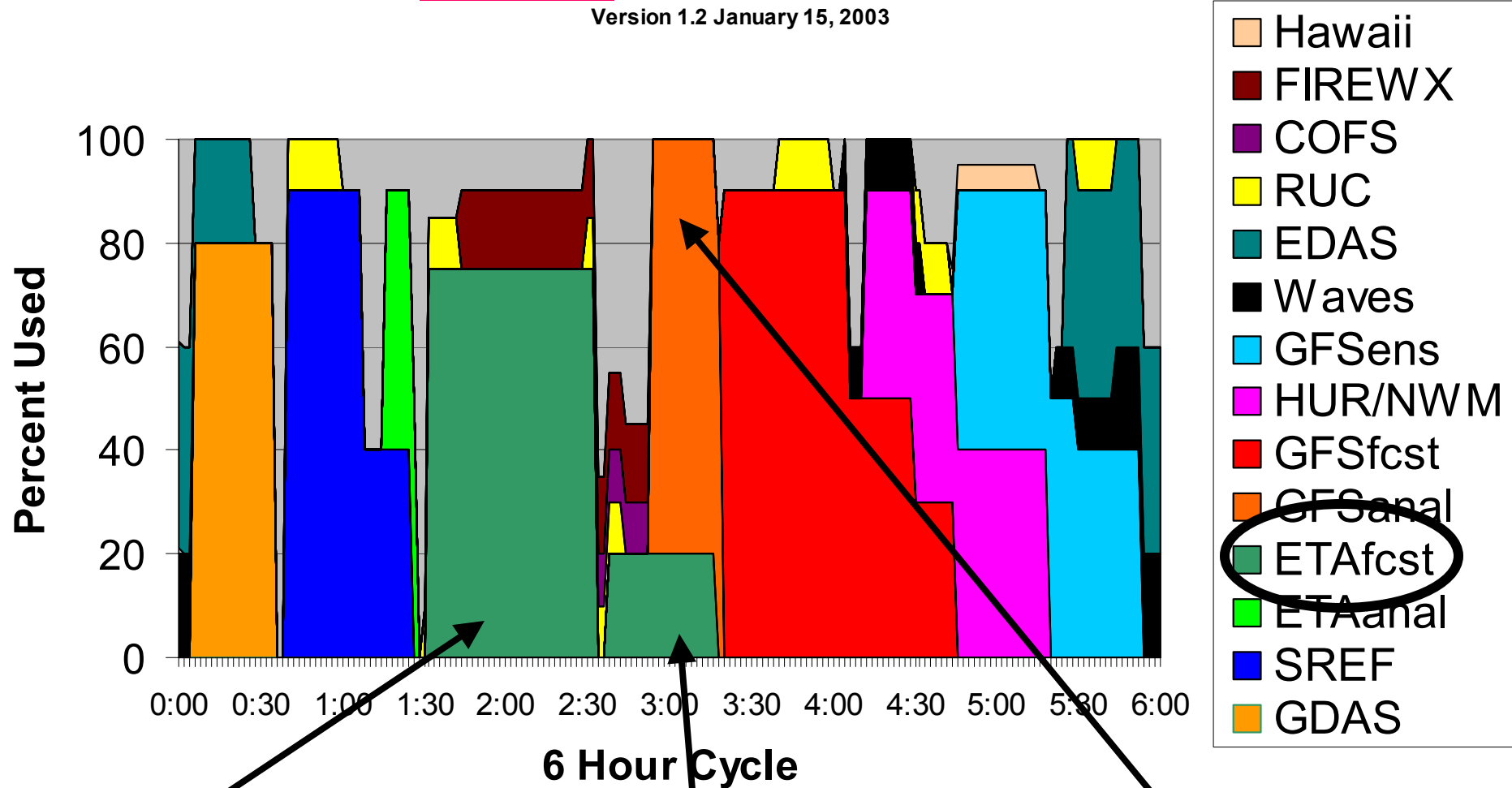
Downscaled GFS with Eta Extension (DGEX)

- Background and Motivation:
 - Designed to bring quick relief to forecasters by giving physically consistent and seamless option for high resolution medium range grids
 - Has received broad support from Regions
- Model Design:
 - Eta12 lateral boundary conditions (LBC) from GFS applied at 84 hrs on small, CONUS-scale domain
 - LBC applied every 3 hrs, through 192 hrs
 - run CONUS domain at 06z & 18z using 00Z and 12Z GFS
 - Computing resources from consolidation of 0-84 hr Eta run
 - NCEP has run Eta to 10+ days using MRF with few ill effects

Wx Production Suite Made Up of Four Uniform Cycles per Day

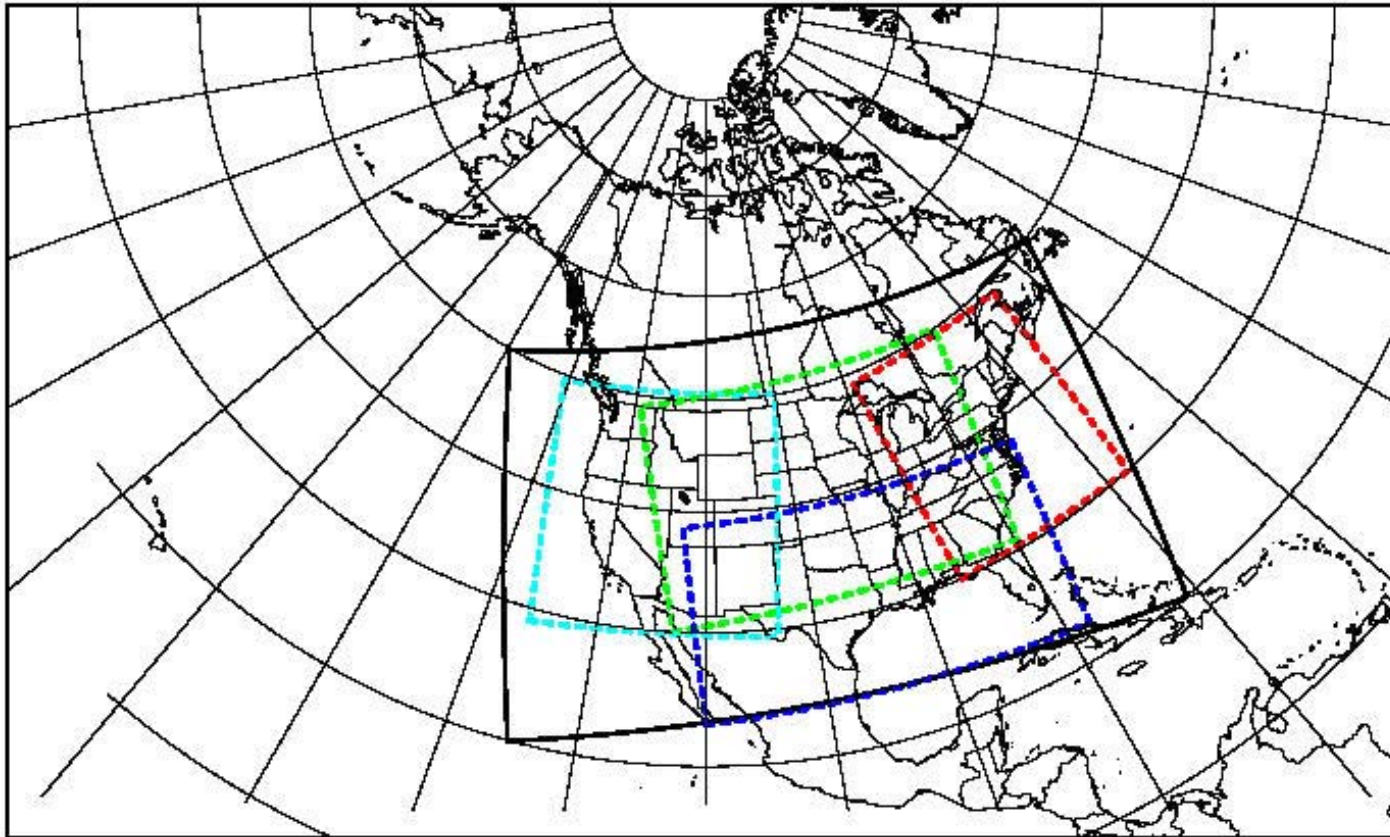
Proposed NCEP Production Suite Weather Forecast Systems

Version 1.2 January 15, 2003



DGEX CONUS Domain

With Regional Distribution Tiles



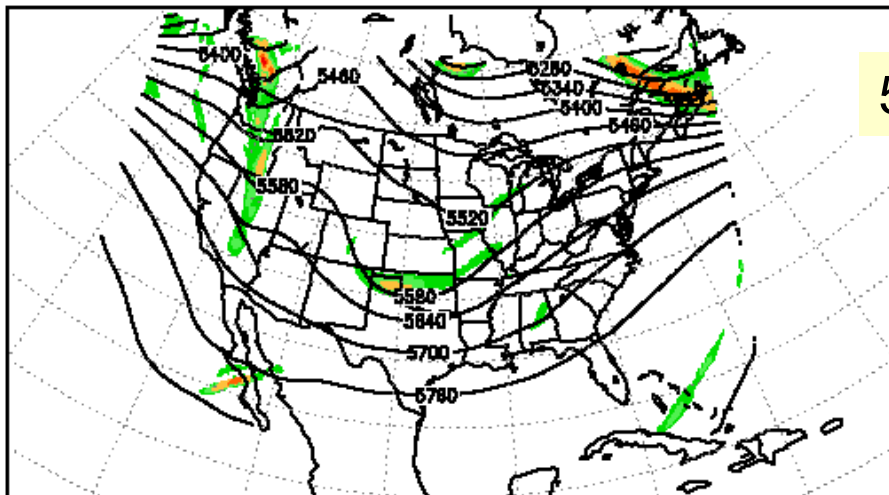
Dashed = Eta output grids for 8-day extension

-140

-80

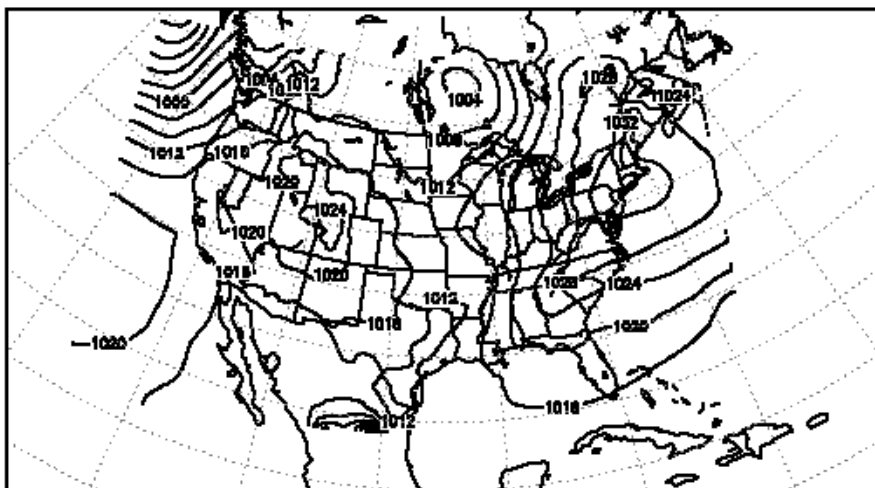
Test of DGEX vs. GFS

500MB Z-VORT ETA 174H FCST VALID 06Z 23 DEC 2003

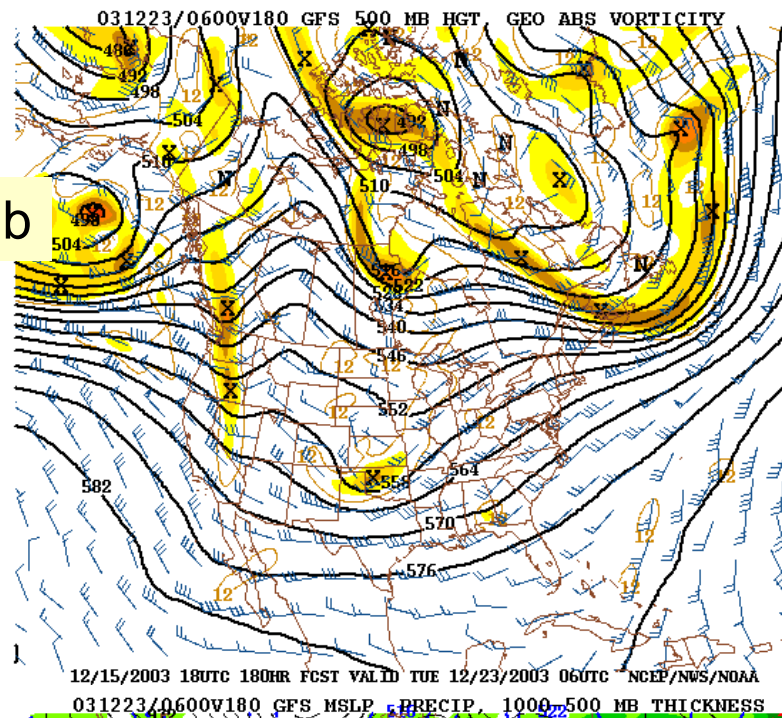


174 hr DGEX valid 06Z 23 Dec 03

SLP ETA 174H FCST VALID 06Z 23 DEC 2003

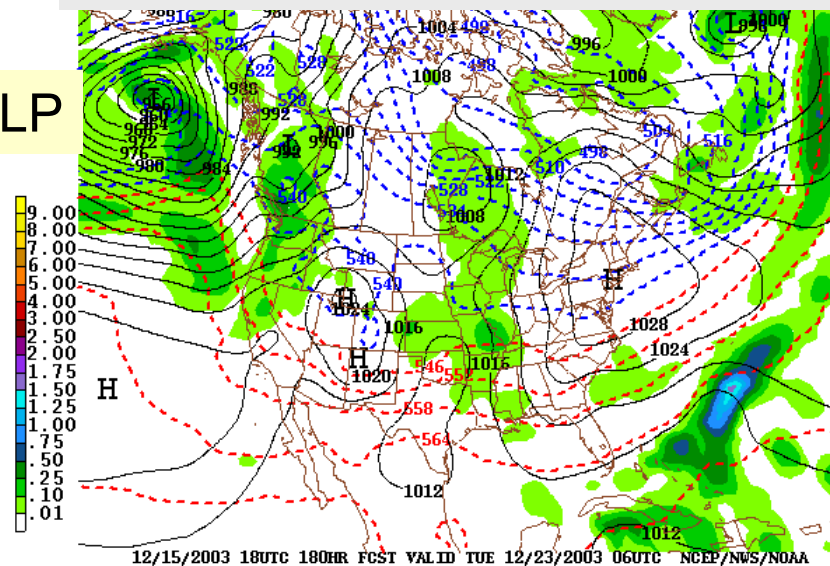


500 mb



180 hr GFS valid 06Z 23 Dec 03

MSLP



DGEX (continued)

- Status and timeline:
 - Tasking complete
 - Change Notification in process (consolidation of Eta run)
 - Frees up computer time to run DGEX
 - Test grids available to setup optimal baseline SmartInit
 - March: 30-day testing and evaluation period
 - Forecasters at a subset of WFOs to assess impact on operations
 - Better evaluation of internal drift issues (limited set of fields available via a webpage)
 - Test Regional WAN distribution method
 - HPC will perform model diagnostics

DGEX on SBN

Implementation Timeline

- Mid April: convergence of Eta runs complete and Eta extension running operationally
 - GRIB1 Regional distribution continues
- Late May: DVB-S efforts free up SBN bandwidth
- June: OB3.2 upgrade to AWIPS configuration
- June: Eta extension operational via SBN using GRIB2

Updated ISST Roadmap

- New prioritized list of action topics:
 - Analysis of Record
 - Digital Services forecast process
 - Climatology
 - Downscaling (long-term solutions)
 - Review of 10-506 (preliminary review to OCWWS by late March)
 - Uncertainty and probabilistic information
- Short term actions (next 2-3 months):
 - Verification (prioritize tasks in NVIWT Verification Plan)
 - Input to 10-102 (declaring elements official)

Activities with Ongoing Monitoring

- Grid change management
- GFE enhancements
- SBN data
 - GFS bottleneck on mainframe
- TCM (Tropical Cyclone Message)
- Gridded MOS

Analysis of Record

(A real-time, mesoscale analysis of all forecast grids)

- Lots of ideas and discussion, but effort must be organized quickly
- Grid spacing must match highest-resolution forecasts
- Will have to mature from early prototype 2-d analysis of primary fields
- Impact of model used for first guess must be accounted for and minimized
- Observation system must be supported
- Some groups already designing systems to include analysis of record and associated analysis techniques

Analysis of Record (continued)

- This may prove to be the Holy Grail of the digital era
- Unfortunately, it is an integral part of:
 - The forecast process
 - Verification
 - Customer motivation and acceptance
 - Conditional climatologies
 - Statistical applications and bias corrections
 - Numerical weather prediction

Analysis of Record (continued)

- Seeking a solution
 - Charter a team to create an “Analysis of Record” Roadmap
 - Diverse team of experts (both within and outside NWS)
 - Seek assistance from research community
 - USWRP
 - CSTAR
 - COMET projects
 - Plan should thoroughly examine existing analysis systems for possible inclusion or modification
 - Inventory and coordinate Regional efforts already underway
 - Work in coordination with MDL and NCEP

FSL Resources for GFE Development

- FSL role still critical to attaining field functionality
- IFPS focal point position paper last fall
- Tentative agreement to fund another FTE
- Effort de-railed
- Especially with VTEC emphasis, resources not available to meet immediate field requirements

Closing comments

- Good progress over past 8 months
 - still learning and adjusting process as we go
- We endorse Digital Services Program Office
 - desperately need program leadership
- Verification is still critical to decision making process and must gain momentum
 - currently examining Verification Plan (dated 12/31/03) for prioritization and implementation planning

Background Slides

- COOP MOS examples
 - Using MatchMOSAll
- OB3.2 or 4 Eta12 parameter list
- DGEX parameter list

COOP MOS

- The graphics to follow are a GFS MaxT forecast from MatchMOSAII.
 - The first image is running MatchMOSAII with just standard GFS MOS.
 - The second image is running MatchMOSAII with standard GFS MOS plus the COOP MOS (there are additional COOP stations used in the analysis that are outside the SLC CWA).
 - The third image is the difference between the 1st two images.
- These graphics are produced using Tim Barker's MatchMOSAII run on the background GFS SmartInit grid in GFE. Tim's tool uses an elevation dependent serpentine fit to whatever points are available to the routine.
- As of February 1, 2004, 25 offices have registered as using getCoopMOS (to download data) and 40 have registered to use MatchMOSAII (to use the data); typically only about half of those that download the software register it
- Sample of text bulletin derived from GFS COOP MOS

GFS-BASED MOS COOP MAX/MIN GUIDANCE 1/27/04 1200 UTC

Wasatch front-----

WED 28| THU 29| FRI 30

ALPINE UT 28 42| 29 42| 30 46

BOUNTIFUL-VAL VER UT 28 41| 29 44| 31 45

DRAPER POINT OF M UT 29 43| 30 49| 32 50

FAIRFIELD UT 21 42| 22 45| 20 45

GARFIELD UT 31 44| 32 47| 34 47

LEVAN UT 22 42| 22 46| 25 46

NEPHI UT 22 40| 23 44| 24 46

OGDEN SUGAR FACTO UT 28 41| 28 44| 29 45

OLMSTEAD P H UT 28 42| 29 46| 28 47

PLEASANT GROVE UT 28 42| 29 47| 31 46

PROVO BYU UT 29 42| 30 47| 32 48

SALT LAKE CITY E UT 28 41| 29 45| 29 47

SANTAQUIN CHLORIN UT 26 41| 26 45| 27 46

SPANISH FORK PWR UT 28 41| 28 45| 28 46

THIOKOL PROPULSIO UT 25 38| 25 42| 23 41

UTAH LAKE LEHI UT 22 42| 22 44| 23 45

VERNON UT 21 43| 23 46| 22 47

Cache Valley-----

WED 28| THU 29| FRI 30

PRESTON ID 23 37| 24 35| 24 41

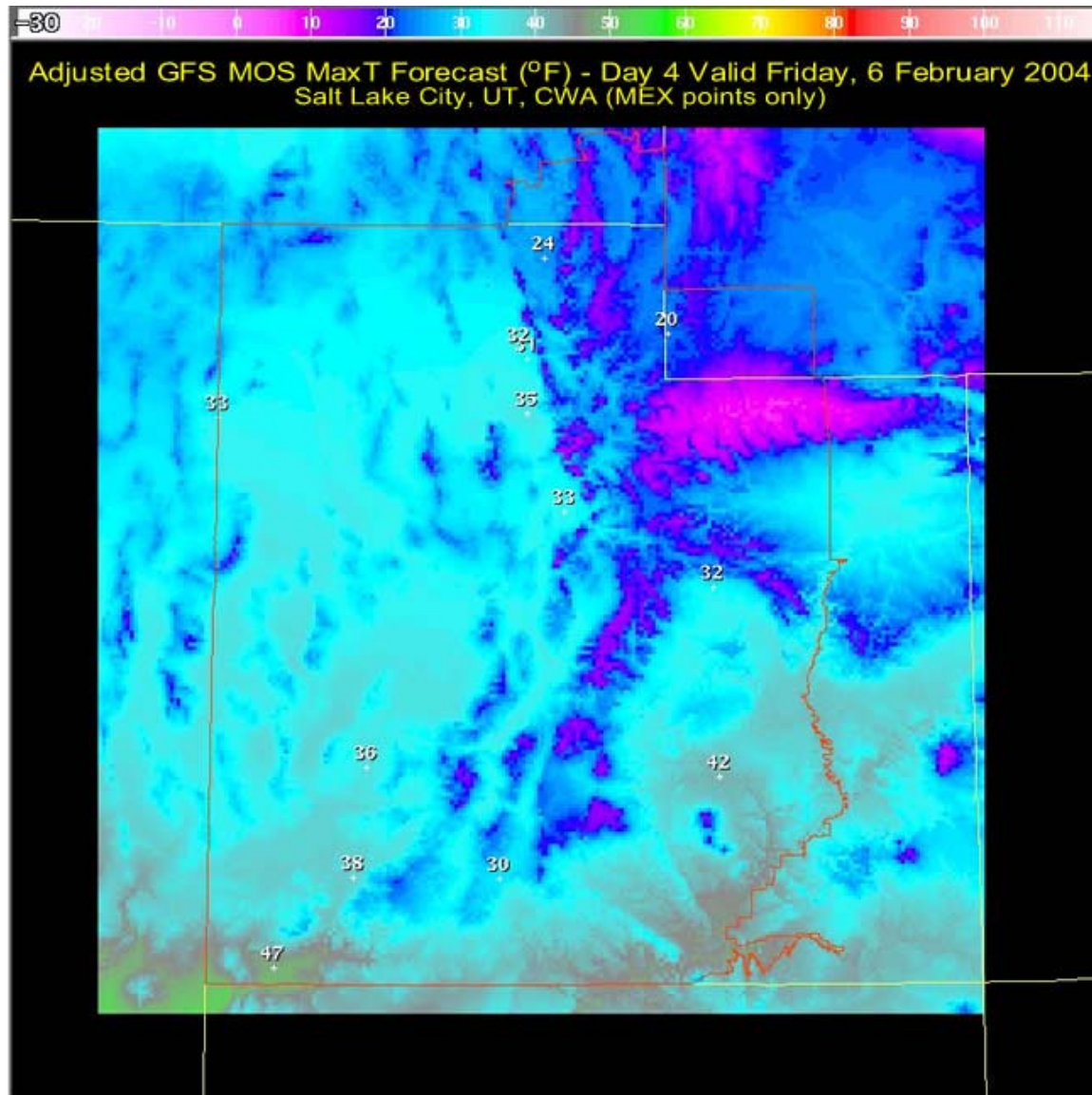
LOGAN RADIO KVNU UT 23 39| 26 42| 24 42

LOGAN UTAH STATE UT 27 40| 26 38| 26 43

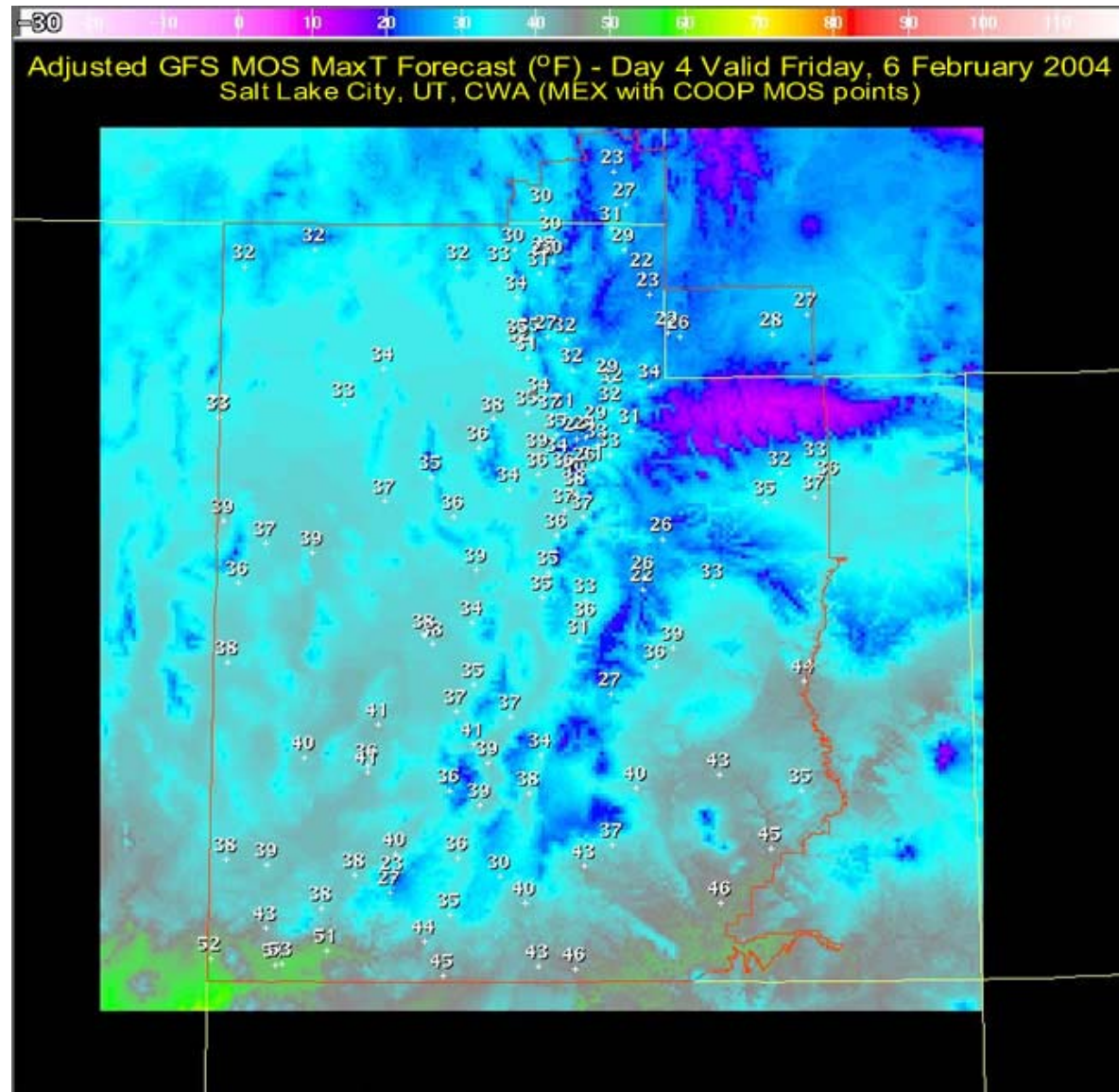
LOGAN 5 SW EXP FA UT 25 39| 26 40| 25 43

RICHMOND UT 26 38| 29 42| 25 40

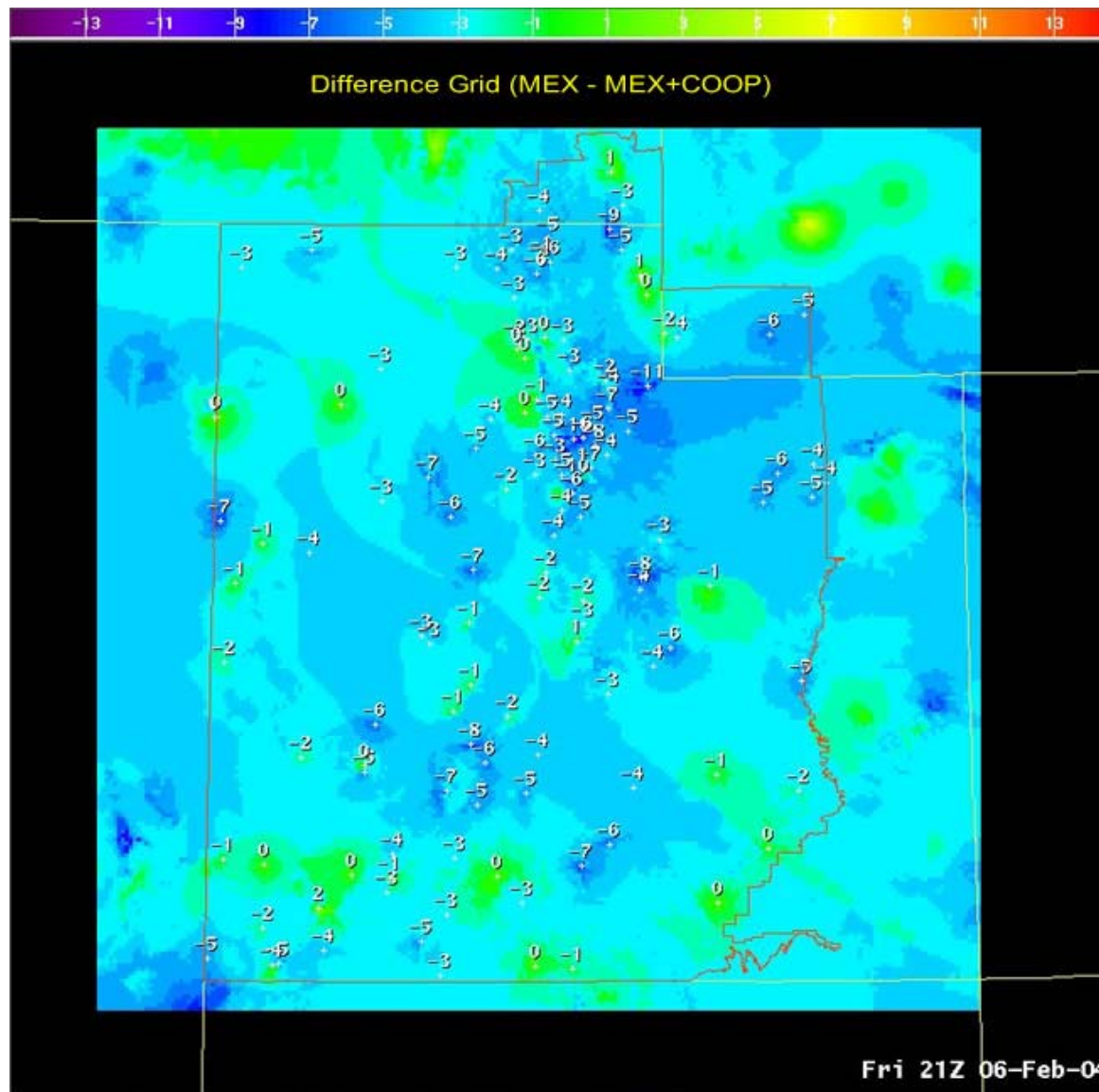
MatchMOSAII with just standard GFS MOS



MatchMOSAII with standard GFS MOS plus the COOP MOS



Difference between the two grids (grid using GFS MOS only – grid using GFS and COOP MOS)



Proposed Full Eta12 Parameter List

- A. 29 Levels (for Height, Vertical Velocity, and Cloud Fraction) [1000, 975, 950, 925, 900, 875, 850, 825, 800, 775, 750, 725, 700, 675, 650, 625, 600, 575, 550, 525, 500, 450, 400, 350, 300, 250, 200, 150, and 100 mb]
- B. 36 Levels (for Temperature and Relative Humidity) 2m, BL (6) [0-30m, 30-60m, 60-90m, 90-120m, 120-150m, and 150-180m AGL], and 29 Levels from (A)
- C. 36 Levels (for u- and v-wind) same levels as (B) except 10m instead of 2m
- D. 3 Levels (for Lifted Index, Best LI, CAPE and CIN) SFC, BL (2) [0-90m and 90-180m AGL]
- E. 4 Levels (for Potential Vorticity, Potential Temperature, P.V. u-wind, and P.V. v-wind) 0.5, 1.0, 1.5, and 2.0 PVU surfaces
- F. 4 Soil Depth Layers (for Total Vol. Soil Moist. And Soil Temp) 0-10cm, 10-40cm, 40-100cm, 100-200cm

DGEX Parameter List

- Pressure at surface
- Pressure at MSL: (nice if you have both Eta and Normal reduction)
- T at 6 levels: 2meter, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- RH at 6 levels: 2meter, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- Uwind at 6 levels: 10m, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- Vwind at 6 levels: 10m, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- Total Precip at surface
- Total Cloud Cover
- Max temperature at 2meter (time period is unclear in current file)
- Min temperature at 2meter (time period is unclear in current file)
- Probability of Freezing Precip - for Wx Smartinit
- Probability of Frozen Precip - for Wx Smartinit
- Probability of Thunderstorms - for Wx Smartinit
- Terrain height (only once - not every time-step)
- Geopotential Height: 500mb
- Synoptic parameters (for assessment of model synoptics):
 - Sea Level Pressure
 - QPF
 - 1000 mb - Height
 - 850 mb - Height Temperature Relative Humidity Wind
 - 700 mb - Height Temperature Relative Humidity Wind Omega
 - 500 mb - Height Temperature Relative Humidity Wind
 - 250 mb - Height Wind
 - Lifted Index (Surface Based)